

station, and the height, determined by computation, through a chain of triangles over 400 miles long, from Buffelsfontein station, the height of which was determined by levelling operations at Port Elizabeth, was only 16 feet.

Most of the astronomical observations were made with the Repsold theodolite, but before its arrival the latitudes were determined by a Talcott zenith telescope, constructed by Troughton and Simms. As regards latitudes the preliminary results only are given, for since the observations were made the whole of the stars have been reobserved on the meridian with the Cape transit circle. The origin of all the longitudes is the centre of the transit circle, and all the results depend upon signals exchanged with the Cape Observatory. The longitude of Durban was determined as part of the work in the telegraphic connection of the longitudes of Aden and the Cape; and observations of longitude were made at other places, as circumstances admitted, by Colonel Morris, Mr. Maclear, and Mr. Pett. Astronomical observations of azimuth were made at several of the principal stations, and the observed azimuths were referred to lines of the principal triangulation.

The survey, on the whole, appears to give results slightly in favour of Airy's elements of the earth as compared with Clarke's, but, as Dr. Gill remarks, this conclusion must be adopted with great reserve. For final results we must await the completion of Dr. Gill's original scheme.

Colonel Morris' Report contains a statement of the formulæ and methods of computation, with the auxiliary tables employed, which will be of the greatest use to Government surveyors in the colony; and his whole Report will be of great assistance to any one who has to conduct similar operations in other parts of the world. The Report is illustrated with excellent lithographic plates of the theodolites, the base-measuring apparatus, Comparateur, triangulation, &c., and the Government printers at the Cape have successfully carried out what must have been to them no easy task.

C. W. WILSON.

IN THE AUSTRALIAN BUSH AND ON THE COAST OF THE CORAL SEAS.¹

PROF. RICHARD SEMON, of Jena, the author of the above volume, will be well known to biological readers in connection with the valuable monographs that, under the title of "Zoologische Forschungsreisen in Australien und dem Malayischen Archipel," have been produced by himself, Prof. Ernst Haeckel, E. von Martens, and other accomplished collaborators as the outcome of his travels and collections in the aforesaid regions during the years 1891-92.

The treatise under review is written in an essentially popular vein. It is a narrative of his voyage out to Australia; residence in and investigations conducted concerning the fauna of limited districts of that island continent; and of his homeward route, with a detour embracing New Guinea and a considerable area of Malaya. The larger section, associated with the title of "The Australian Bush," deals only with portions of the easternmost of the six Australian colonies, that of Queensland. The main object of Prof. Semon's expedition was the investigation of the embryological phenomena of those archaic zoological types peculiar to the Australian region. The lung-fish, *Ceratodus Forsteri*, and the monotrematous mammals *Platypus* and *Echidna*, whose unique, egg-laying habits were for the first time incontestably demonstrated some years since (1884) by our fellow-

countryman, Mr. W. H. Caldwell. With this specified end in view, M. Semon proceeded to South Queensland and camped out for several weeks on the banks of the rivers Burnet and its tributary the Boyne, at some little distance from the townships of Gayndah and Coonambula. All three of the zoological types named are indigenous to this watershed (*Ceratodus* existing nowhere else), and by making liberal use of the assistance of the semi-civilised natives an abundant supply of the materials desired were obtained. While a few of the more salient developmental phases of *Ceratodus* and *Echidna* are figured in this volume, their detailed histological delineation and description are relegated to the monographs previously cited.

As the result of the first week's work, and the offered reward of half-a-crown for each female *Echidna*, one alone of the several natives engaged brought in as many as six of these monotremes, and a large assortment of other animals, altogether making good his claim for eleven shillings, after deducting rations. The outcome of the prompt payment of the rewards earned was somewhat disastrous. During Prof. Semon's absence from the camp the succeeding day, the natives contrived to exchange their hard cash for "fire-water" at the nearest hostelry—an undoubted breach of the regulations on the part of the vendor—and with the consequence that every man, woman and child, some thirty all told, were, on the learned Professor's return, dead drunk. A similar bacchanalian carouse, with threatened hostilities among themselves, is recorded as having followed the payment of the yet more liberal prize of 100 marks (£5), that was awarded to the first of the band of aborigines to bring in the ova of *Ceratodus*. In the case of such substantial sums being won by natives of such essentially child-like irresponsibility, the proper course would undoubtedly have been to have lodged the money for disbursal for their benefit in the hands of some one of the neighbouring responsible settlers.

In his brief reference to the life-habits of the *Echidna*, Prof. Semon places on record an interesting demonstration of the conspicuous homing instincts, and also of the travelling capabilities of the species. An example brought into the camp from a distance of no less than 6 kilometres, escaped in the night from the sack in which it was confined. A native following up its track, found it the following morning reposing in close vicinity to the spot where it was originally captured. The data chronicled, though apparently not from direct observation, concerning the food habits of the *Echidna*, in M. Semon's book, are somewhat at variance with those personally determined. It is here stated that worms and insects of all descriptions (Kerbtieren aller Art), though more particularly ants, constitute its normal pabulum. Also that ants, in the ordinary sense of the term, are devoured after the fashion peculiar to the typical ant-eaters, *Myrmecophagidæ*. With the several examples kept by the writer for long intervals, and which becoming tame were permitted to seek their nourishment in their native "bush," it was found that these *Echidnæ* not only limited their attention to ants, but in this connection cared only for the white succulent larvæ and pupæ or, so-called, eggs. Ants in their ordinary adult form, as in a teeming ant-track, would be altogether ignored. At the same time while consuming the larvæ, to gain access to which they tear open the hillocks, or overturn stones with their powerful claws, a considerable number of adult ants may be adventitiously ingested.

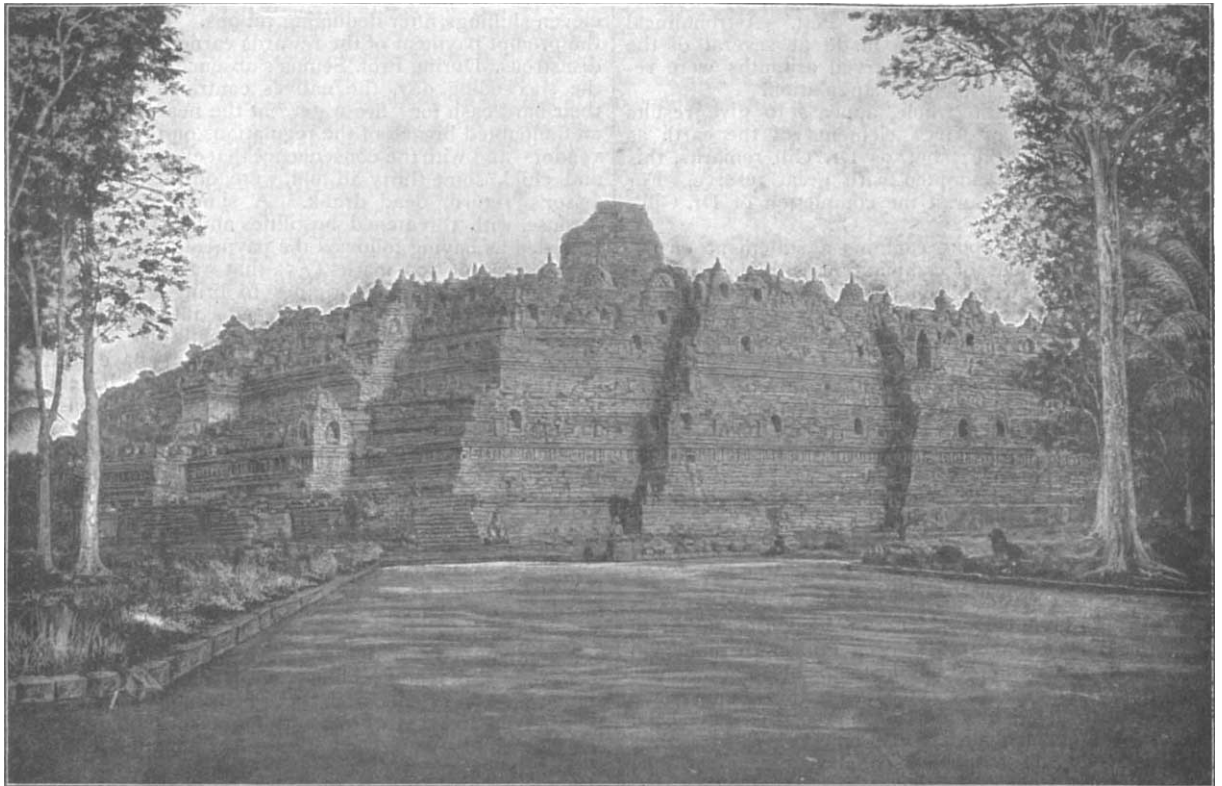
The quest for the ova of *Ceratodus* proved to be a more lengthened task. No less than eight months were occupied in obtaining an accurate knowledge of that animal's spawning season, and in registering the developmental features of the ova when obtained. The persevering search, coupled with the handsome reward offered to the natives previously recorded, resulted in the ultimate acquisition of an abundant supply of material,

¹ "Im Australischen Busch und an den Küsten des Korallenmeeres-Reiseerlebnisse und Beobachtungen eines Naturforschers in Australien, Neu-Guinea und den Molukken." Von Richard Semon. 8vo, pp. xiv + 556. Mit 85 Abbildungen und 4 Karten. (Leipzig: Wilhelm Engelmann, 1896.)

and from which, through the conservation of specimens in suitable receptacles in the adjacent stream, every essential developmental phase was successfully recorded. The time spent in waiting for the spawning of *Ceratodus* was fully occupied by Prof. Semon in accumulating zoological material of every available description. His book constitutes also a full and interesting narrative of his experiences as a "new chum," or novitiate in Australian bush life, together with an abundance of information on colonial matters generally, in so far as they relate to Queensland. In this manner his descriptions of the fauna and flora are liberally interspersed with popular accounts of cattle mustering and branding, meat freezing works, sugar and gold-mining industries, and even dissertations on sports and politics. The pages of Prof. Semon's volume abound with illustrations, photographs of his camping stations and their environments, of the

deterred by counter-attractions from devoting special attention to this subject—that phenomenal formation the Great Barrier Reef. Prof. Semon concludes his discussion of the Darwinian and newer theories that have been advanced concerning its origin, by a declaration (p. 273) altogether in favour of the Darwinian or subsidence interpretation, as applied not only to the Australian, but to most other Barrier and Atoll reef formations.

Leaving Australia and having visited New Guinea, M. Semon extends his travels to Java, Celebes and Ceram, devoting a considerable time at Amboyna to exploring and collecting in the life-teeming coral seas of that district. A special object of his ambition in these latitudes was the investigation of the developmental history of *Nautilus pompilius*. Unfortunately the time of his visit was not favourable for the acquisition of the



Buddhist Temple of Boro Budor, Java.

semi-civilised natives in his employ, and the animals characteristic of the district. It is to be regretted, being as demonstrated an expert with the camera, he should, as is conspicuously evident, have contented himself with reproducing the portraits of the animal forms from mounted or preserved specimens only.

From Southern Queensland, Prof. Semon travelled northward, making a stay of some weeks in the plains and scrublands inland from Cooktown, intent on the collection of marsupial embryological material, and also at Thursday Island for the acquisition of the abundant marine zoological products of Torres Straits. The chapters devoted to these selected centres of investigation constitute, it might be added, a comprehensive gazetteer to the townships of the East Queensland coast. The nature and configuration of the associated coastline receives also a share of notice, including—although

desired material, the Nautili being then in deep water. Inquiries elicited the fact that it is only during the south-east monsoon, from May to September, that this Cephalopod enters the shallow coastal waters for the purpose of depositing its spawn. By leaving suitable materials for their conservation, a consignment of half-a-dozen examples of this, in the flesh, rarely-obtained species were subsequently remitted to M. Semon from Amboyna.

The latter portion of Prof. Semon's book abounds with admirable photographs of the characteristic landscapes of the tropical districts visited and described. Mingled with these are a few notable Oriental architectural and social scenes, that of the Javanese rock-hewn Buddhist temple of Boro Budor, shown in the accompanying illustration, being especially fine. With the exception, however, of a drawing of the Robber Crab (*Birgus latro*), no zoological subject is figured, and one is somewhat

disappointed that none of the many opportunities occurring were utilised of recording with the camera glimpses of the marine paradise and its wondrous inhabitants that are so abundantly discussed. Photographic replicas of coral scenes and their associated denizens have of late years been shown to be fairly easily attainable, and appeal more intelligibly to the comprehension of the lay reader than a wealth of descriptive text. This shortcoming notwithstanding, Prof. Semon's book may be recommended as a most readable and instructive one to all those to whom the Australian bush and coral strands are *terra incognita*.

Should Prof. Semon contemplate another tropical Australian expedition, we would earnestly recommend him to provide himself with one of the simple mosquito tents, procurable at any of the northern ports. Armed with this device, the night of torture on the Jardine River, so graphically described at page 333 *et seq.*, would have been shorn of all its terrors, the shrill piping of the baffled enemy outside the canvas adding but a zest to the peaceful enjoyment of his otherwise vainly invoked repose.

W. SAVILLE-KENT.

THE READING, WRITING, AND ARITHMETIC OF THE NEOLITHIC TROGLODYTES.

A DISCOVERY of great interest has recently been made by M. Ed. Piette, and published by him in *l'Anthropologie* (Tome vii., 1896, p. 385). In a cave at Mas-d'Azil,¹ on the left bank of the Arise, in the Department of Ariège, he excavated a layer of pebbles that had been painted with peroxide of iron in various devices. These occurred above a deposit containing bones of the reindeer, red deer, aurochs, horse, &c., and below a cinder layer, in which were great quantities of a land-snail, *Helix memoralis*, which indicates a somewhat humid climate; above this were deposits, in which polished stone axes occurred, and also *Helix hortensis*, which suggests drier conditions.

The Quaternary Period, according to M. Piette, was divided into two eras—the end of the Glacial Period forming the dividing line.

The intermediate Transition Period commenced when the modern fauna had replaced the glacial fauna; it consisted of three phases: (1) the Cervian, when the implements were of the same form as those of the earlier Quaternary era, and when the hunters of the reindeer made harpoons and needles of reindeer bones, and engraved upon their antlers. The climate then ameliorated, as evidenced by the presence of trees, and the reindeer passed away; and (2) the Asylian phase, or the period of coloured pebbles occurred. By this time man had forgotten the arts of engraving and carving, and commenced to devote himself to cultivation, and painted quaint forms on rolled stones. (3) The Snail-shell phase indicated a warmer humid climate, when vegetation flourished, and man cultivated several kinds of fruit trees.² Although the last two layers belonged to the Neolithic Period, polished stone axes were not found in them, though they occurred at a higher level associated, as has been already stated, with *Helix hortensis*.

The ruddled pebbles are mostly rounded, oblong, and flattened pebbles of quartz or schist taken from the bed of the river. In some cases the whole surface is coloured, but most frequently a stone is marked on one or both sides with simple devices. Sometimes the margin of the pebble is painted so as to form a kind of border to the decoration (Figs. 3 and 5).

¹ A description of this remarkable tunnel-like cave was given by M. E. Cartailhac in *l'Anthropologie* (Tome ii., 1891, p. 141). This paper was illustrated by two figures of the cave itself, and by a plate of some of the painted pebbles.

² M. Piette has already published a paper on the cultivated plants of the Transition Period at Mas-d'Azil in *l'Anthropologie* (Tome vii., 1896, p. 1).

M. Piette classifies the devices as follows: numerals, symbols, pictographic signs, and alphabetical characters.

(1) *Numerals*.—A large number of stones were found with from one to eight lines (Figs. 1 and 2) running across them. These the author considers as indicating simple numerals. Never have more than eight lines been yet found on a stone. Some of the pebbles are marked with rounded or oval spots (Fig. 3). These are regarded as units of higher groups of figures—either nines, or more probably tens, and the Egyptian system is adduced as an argument in favour of this view. The spots vary in number, one stone bearing as many as twenty-three.



FIG. 1.



FIG. 2.



FIG. 3.

Occasionally marginal blotches were painted. The author's enthusiasm has led him to speculate whether these may not be the squares of the higher grade units; thus, a pebble (Fig. 4) with twelve marginal blotches and six central spots is credited with indicating a total of 1260 in the decimal system; or $1728 + 60$, that is, 1788 on a duodecimal hypothesis. It apparently strikes even M. Piette that these are rather high numbers for the Neolithic troglodytes, and so he suggests that there may be no significant difference between central or marginal spots. As a disc surrounded by a circle has during all

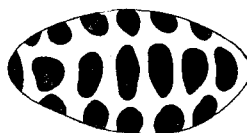


FIG. 4.



FIG. 5.



FIG. 6.

time been considered as the symbol of the sun or of a sun deity, the question is asked, "May not the circles in lines be signs employed in a hieratic writing?" Amongst other suggestions, he speculates whether they may not be meant to denote objects of special value; and, lastly, he seriously proposes the view that these very abundant numeral stones may have been counters in some game. Occasionally these "numerals" are ornamented, as in Fig. 5.

(2) *Symbols*.—M. Piette candidly admits that the conclusions of the "perilous study" of symbolism should



FIG. 7.

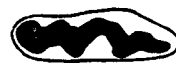


FIG. 8.



FIG. 9.

be stated with the greatest reserve. Crosses, especially the equilateral cross (Fig. 7), are abundant, but the *tan* (Fig. 6) also occurs. We need not follow the speculations to which such designs irresistibly lead.

(3) *Pictographic Signs*.—Serpentine designs (Fig. 8) often occur, and M. Piette gives two personal anecdotes to illustrate the persistence of a superstitious regard for snakes in the Pyrenees and in the Department of Aisne. Other identifications are more doubtful, as, for instance, "trees" (Fig. 9), "reeds," &c.

(4) *Alphabetical Characters*.—The most startling section of this memoir is the suggestion that certain designs